July 10, 2013

**CERTIFIED MAIL** 13-585E CAB
**RETURN RECEIPT REQUESTED** File No. 0008-11
**(7009 2820 0001 6573 4239)**

Mr. Cliff N. Townsend
Plant Manager
Puna Geothermal Venture
P.O. Box 30
Pahoa, Hawaii 96778

Dear Mr. Townsend:

**Subject: Amendment of Noncovered Source Permit (NSP) No. 0008-02-N**
**Application for Modification No. 0008-11**
**Puna Geothermal Venture**
**41 MW (Nominal) Geothermal Power Plant, Wellfield, and Geothermal Exploratory/Developmental Wells**
**Located at: 14-3860 Kapoho-Pahoa Road, Pahoa, HI 96778**
**Date of Expiration: December 14, 2014**

The subject Noncovered Source Permit is hereby amended in accordance with Hawaii Administrative Rules, Title 11, Chapter 60.1. This amendment is based on the plans, specifications, and information that you submitted as part of your modification application dated June 10, 2013, and consists of the addition of production well KS-15 to Pad B Wellfield and the removal of production well KS-4 from Pad E Wellfield. These changes are reflected in the enclosed Attachment IIB which supersedes, in its entirety, Attachment IIB amended on April 29, 2010, November 14, 2011, and December 2, 2011. All other conditions/requirements of the Noncovered Source Permit issued on December 15, 2009, shall not be affected and shall remain valid. A receipt for the application filing fee of $100.00 is enclosed.

If you have any questions, please contact Mr. Darin Lum of the Clean Air Branch at (808) 586-4200.

Sincerely,

STUART YAMADA, P.E., CHIEF
Environmental Management Division

DL:smk
Enclosures
c: Ed Yamamoto, EHS -Hilo
CAB Monitoring Section

**ATTACHMENT IIB: SPECIAL CONDITIONS**
**WELLFIELD AND GEOTHERMAL EXPLORATORY/DEVELOPMENTAL WELLS**
**NONCOVERED SOURCE PERMIT NO. 0008-02-N**

**Amended Date: July 10, 2013** **Expiration Date: December 14, 2014**

In addition to the Standard Conditions of the Noncovered Source Permit, the following emissions unit(s) is subject to the Special Conditions listed below:

## Section A. Equipment Description.

1. This permit encompasses the following equipment and related appurtenances:

    a. Pad A Wellfield: Production Wells KS-9 and KS-10, Injection Wells KS-1A, KS-11, and KS-13, and associated equipment;
    b. Pad B Wellfield: Production Well KS-15, and associated equipment;
    c. Pad E Wellfield: Production Wells KS-5, KS-6, and KS-14, Injection Well KS-3, and associated equipment;
    d. Fourteen (14) Geothermal Exploratory/Developmental Wells;
    e. Drilling rig no. 1 (Rig 51):

        i. Three (3) 877 hp diesel engine drives, Waukesha model L5792, serial nos. 363805, 363806, and 363807;
        ii. Two (2) 435 hp diesel engine generators, Caterpillar model D353, serial nos. 46B09273 and 46B09281; and
        iii. One (1) 950 hp diesel engine for Top Drive unit, Caterpillar model C32, serial no. TLD00590.

    f. Drilling rig no. 2 (Geodrill Rig 4):

        i. One (1) 470 hp rig drive diesel engine, Caterpillar model C-13, serial no. LEE19127;
        ii. One (1) 284 hp diesel engine generator, John Deere model 6068HF485, serial no. PE6068L039306; and
        iii. One (1) 630 hp mud pump diesel engine, Caterpillar model C-18 DITA, serial no. WJH00848.

    g. Portable $H_2S$ Abatement System.

2. The permittee shall permanently attach an identification tag or nameplate on each piece of equipment which identifies the model number, serial number or I.D. number, and manufacturer. The identification tag or name plate shall be attached to the equipment in a conspicuous position.

## Section B. Applicable Federal Regulations

The one (1) 470 hp diesel engine and one (1) 284 hp diesel engine of drilling rig no. 2 are subject to the provisions of the following federal regulations:

1. 40 Code Federal Regulations (CFR) Part 60, Standards of Performance for New Stationary Sources, Subpart A, General Provisions;
2. 40 CFR Part 60, Standards of Performance for New Stationary Sources, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines;
3. 40 CFR Part 63, National Emission Standards for Hazardous Air Pollutants for Source Categories (Maximum Achievable Control Technologies (MACT) Standards), Subpart A, General Provisions; and
4. 40 CFR Part 63, National Emission Standards for Hazardous Air Pollutants for Source Categories (Maximum Achievable Control Technologies (MACT) Standards), Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.

The permittee shall comply with all applicable provisions of these standards, including all emission limitations and all notifications, testing, monitoring, and reporting requirements. The major requirements of these standards are detailed in the special conditions of this permit.

## Section C. Emission and Operational Limitations, and/or Standards.

1. The permit conditions prescribed herein may at any time be revised by the Department of Health to conform to any Federal or State promulgated air quality rules on geothermal facilities.

2. The construction of fourteen (14) geothermal exploratory/developmental wells are to be drilled in TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58, and 1-4-0119, Kilauea Lower East Rift Zone, Puna, Hawaii.

3. This permit does not authorize any of the geothermal exploratory/developmental wells to be connected to and become part of a distribution system which supplies geothermal resource to a power plant or facility, or any well to be used as an injection well for the geothermal resource unless the permittee has obtained all other applicable federal, state or local operating permits.

4. No geothermal exploratory/developmental wells (i.e., wellhead cellar) shall be located within six hundred (600) feet of the property boundary. If any federal, state or county permit or order stipulates a distance greater than six hundred (600) feet in which no geothermal wells (i.e., wellhead cellars) can be located, the greater distance shall so apply.

5. The reworking of any geothermal well covered under this Noncovered Source Permit is prohibited, unless prior written approval is obtained from the Department of Health. "Reworking" is meant to include recompletion of a well; deepening or redrilling (side-tracking) of a well; or other repairs, maintenance or modifications below the casing head. Such activities commonly involve a drilling rig. If the reworking of any geothermal well is considered necessary, the permittee shall submit a written request to the Department of

Health which shall include, as a minimum, a justification for the reworking, procedures and equipment involved, hydrogen sulfide abatement procedures and the estimated emissions. The approval for the reworking of any geothermal well does not relieve the permittee from compliance with all applicable conditions of this Noncovered Source Permit, including all provisions related to well drilling, flow testing, and abated well cleanout.

6. Unless prior written approval is obtained from the Department of Health, each geothermal well shall be shut-in or otherwise prevented from discharging to the atmosphere in accordance with appropriate standards of operation and maintenance and at no time be placed on continuous or standby bleed status at the wellhead or anywhere in the distribution pipeline upon completion of flow testing operations. If the release of any accumulated wellhead gas or any other geothermal fluid is considered necessary, the permittee must submit a written request to the Department of Health which shall include, as a minimum, a justification for the required release, estimated duration of the release, estimated amount of hydrogen sulfide emissions, and a description of the abatement system. The release of any accumulated wellhead gas or any other geothermal fluid shall be directed through a hydrogen sulfide abatement system prior to being discharged to the atmosphere. If a request to release any accumulated wellhead gas or any other geothermal fluid is approved by the Department of Health, the approval may be subject to further conditions.

7. Flaring of excess hydrogen sulfide gas from the completed wells is prohibited without the approval of the Department of Health. If flaring of the excess gas is considered necessary, the permittee must submit a written request to the Department of Health which shall include as a minimum the proposed date, time and approximate duration of the flaring episode, the current and expected well head pressure, the estimated hydrogen sulfide concentration in the well gas, the estimated emission rates for hydrogen sulfide and sulfur dioxide, an air quality impact analysis for sulfur dioxide, the probable cause of excess gas buildup, and an assessment of any abatement alternatives.

   If a request to flare excess gas is approved as necessary by the Department of Health, the approval may be subject to specified conditions. These conditions may include, but are not limited to, provisions requiring the permittee to install, operate, and maintain sulfur dioxide ambient monitors and to submit to the Department of Health after the flaring event a report on the times flaring actually occurred, the sulfur dioxide emissions determined through either direct or indirect measurements, and any problems encountered during the flaring process.

8. Hydrogen sulfide abatement equipment with a minimum of three thousand (3,000) gallons of sodium hydroxide or an equivalent chemical shall be on the property prior to the initiation of drilling, abated well cleanout and flow testing operations. Chemical storage tanks shall be maintained with sodium hydroxide or an equivalent chemical at all

times with no less than a three (3) day operating supply. Chemicals equivalent to sodium hydroxide shall obtain prior written approval from the Department of Health before use.

9. During well drilling, flow testing and abated well cleanout operations, the permittee shall utilize hydrogen sulfide abatement equipment. The hydrogen sulfide abatement equipment shall consist of a cyclonic muffler or other equivalent device designed to minimize particulate and brine aerosol emissions, and direct venting into a vertical direction. A minimum sodium hydroxide treatment mole ratio of 4 to 1 ($NaOH/H_2S$) will be used initially and the abatement efficiency monitored. The optimum mole ratios will be determined during the hydrogen sulfide abatement operations. A specific chemical treatment plan shall be submitted to the Department of Health prior to the commencement of drilling, flow testing and abated well cleanout operations. A copy of the plan shall be maintained at the site at all times and supervisory personnel shall be aware of its provisions at all times.

10. During well drilling operations, the release of any geothermal steam shall be diverted to the hydrogen sulfide abatement equipment or action immediately taken to shut-in the well.

    In no case shall the cumulative steam releases from the well drilling operations result in total abated hydrogen sulfide emissions of five (5) pounds per hour or more. If the cumulative steam releases from the well drilling operations result in total abated hydrogen sulfide emissions of five (5) pounds per hour or more, the permittee shall take immediate action to shut-in the wells.

11. During flow testing and abated well cleanout operations, the permittee shall utilize hydrogen sulfide abatement. If the abated hydrogen sulfide emission rate increases to five (5) pounds per hour or more, or if any steam is released through the power plant emergency steam release facility, the permittee shall cease operations and shut-in the well. The problem shall be corrected before testing or cleanout operations can continue.

    During periods of flow testing, abated well cleanouts, and well equipment failure or malfunction which result in hydrogen sulfide ambient air concentrations exceeding the specified limits in Attachment IIB, Special Condition No. C.15, the permittee shall apply appropriate measures to control and minimize any air emissions and take immediate steps to correct the condition. If the well equipment in question cannot be repaired within twenty-four (24) hours of the occurrence, the permittee shall cease operations and shut-in the well in accordance with Attachment IIB, Special Condition No. C.15.

12. The unabated venting of a geothermal well is prohibited. During abated well cleanout and flow testing operations, the geothermal resource shall be directed through the hydrogen sulfide abatement equipment. Flow testing and abated well cleanout operations shall be conducted only during the daytime and performed for no more than a total of four (4) hours.

In no case shall any abated well cleanout coincide with any pipeline cleanouts, well drilling which opens new holes, or well flow testing operations, or commence if the power plant emergency steam release facility is being utilized. If emergency steam releases from the power plant occur during any abated well cleanout, the well cleanout operations shall be terminated as quickly as practical.

13. The permittee shall install a control system acceptable to the Department of Health for the throttling of steam flow and the soft shut-in on each development well prior to the well being connected to a resource distribution system.

14. To prevent well blowouts, the permittee shall employ good drilling practices with proper blowout prevention equipment and experienced personnel in the drilling of the exploratory/developmental wells. Drilling supervisors shall be certified in blowout prevention at a minimum of once every two (2) years by a certified trainer.

15. The combined emissions of hydrogen sulfide from the geothermal power plant and associated wellfield, including periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of ten (10) ppb on a twenty-four (24) hour rolling average or twenty-five (25) ppb on a one (1) hour average at or beyond the project boundary. Should any of the air quality monitoring stations indicate a hydrogen sulfide ambient air concentration greater than ten (10) ppb on a twenty-four (24) hour rolling average or twenty-five (25) ppb on a one (1) hour average, the permittee shall cease all well drilling, flow testing, and abated well cleanout operations, and shall shut-in those wells experiencing equipment failure or malfunction which result in emissions of hydrogen sulfide. The affected wellfield construction activities shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the contributions from the well drilling, well flow testing, abated well cleanout operations or well equipment repair will not result in or contribute to the exceedance of the hydrogen sulfide ambient concentration of ten (10) ppb on a twenty-four (24) hour rolling average or twenty-five (25) ppb on a one (1) hour average.

16. During those periods of normal power plant and normal wellfield operations, the combined emissions of hydrogen sulfide from the geothermal power plant and associated wellfield shall not cause an increase in the hydrogen sulfide ambient concentration in excess of five (5) ppb (above background) on a one (1) hour average at or beyond the project boundary as monitored at any of the air quality monitoring stations and so identified in the monthly monitoring report. As used in this context, a normal power plant operation is a power plant which is operating without any pipeline cleanouts, upsets, equipment failure, malfunction or which is otherwise operating normally. A normal wellfield operation is a wellfield in which no well drilling, flow testing, or abated well cleanout are occurring and where the completed wells are not experiencing any equipment failure or malfunction and are either shut-in, being used as an injection well, or connected to a sound geothermal resource distribution system.

17. The permittee shall have wind socks placed at two opposite edges of the drill site and on the drill floor.

18. The permittee shall maintain a twenty-four (24) hour telephone service to accept calls concerning this permit. This telephone number must be operational prior to commencement of drilling operations.

19. The three (3) 877 hp, two (2) 435 hp, and one (1) 950 hp diesel engines for drilling rig no. 1, and one (1) 630 hp diesel engine for drilling rig no. 2 shall be fired only on fuel oil no. 2 with a maximum sulfur content not to exceed 0.5 percent by weight. The one (1) 470 hp diesel engine and one (1) 284 hp diesel engine for drilling rig no. 2 shall be fired only on fuel oil no. 2 with:

    a. A maximum sulfur content of 0.0015% by weight; and
    b. A cetane index or aromatic content as follows:

        i. Minimum cetane index of 40; or
        ii. Maximum aromatic content of 35 volume percent.

20. The total combined fuel usage of all nine (9) diesel engines shall not exceed 250,000 gallons in any rolling twelve (12) month period.

21. For any six (6) minute averaging period, the exhaust from each of the diesel engines shall not exhibit visible emissions of twenty (20) percent opacity or greater, except as follows: during start-up, shutdown, or equipment breakdown, each of the diesel engines may exhibit visible emissions greater than twenty (20) percent opacity but not exceeding sixty (60) percent opacity for a period aggregating not more than six (6) minutes in any sixty (60) minutes.

## Section D. Monitoring and Recordkeeping.

1. The permittee shall operate and maintain a minimum of three (3) meteorological monitoring stations, three (3) ambient air quality monitoring stations for hydrogen sulfide and one (1) $PM_{10}$ monitor. The monitoring stations required in Attachment IIA, Special Condition No. C.4 shall be used towards fulfilling this requirement.

2. At the discretion of the Department of Health, the permittee may at any time be required to install, operate, and maintain additional ambient air quality and meteorological monitoring stations, but only after due notice to the permittee on the reasons for the proposed change and providing the permittee an opportunity to respond within **seven (7) working days**.

3. The permittee shall monitor the hydrogen sulfide concentration and emission rate during drilling, flow testing, and abated well cleanout operations.

4. During well drilling operations, records of each steam release associated with upsets, equipment failures or malfunctions shall be maintained and include as a minimum, the date, time and duration of steam release, the resultant hydrogen sulfide emissions, chemical injection rate, steam flow rate, and any corrective measures taken.

5. The permittee shall operate and maintain a non-resetting fuel metering system for the permanent recording of the total gallons of fuel consumed by the nine (9) diesel engines associated with the drilling rigs for the purpose of the fuel limitation specified in Attachment IIB, Special Condition No. C.20. The permittee shall maintain records on a monthly and rolling twelve (12) month basis on the total amount (gallons) of fuel oil consumed by the nine (9) diesel engines. The installation of any new non-resetting meters or the replacement of any existing non-resetting meters shall be designed to accommodate a minimum of five (5) years of equipment operation, considering any operational limitations, before the meter returns to a zero reading.

6. The permittee shall keep invoices of fuel deliveries for the diesel engines identifying the delivery dates and the type and amount of fuel (gallons) received. Include with the records copies of the supplier's certificate of analysis showing the sulfur content (percent by weight), cetane index or aromatic content (volume percent) of the fuel delivered, as applicable.

7. The permittee shall keep a log identifying the diesel engines used for drilling a well and for the removal of fill or other materials from wells.

8. All records shall be true, accurate and maintained in a permanent form suitable for inspection, retained for a minimum of three (3) years following the date of such records, and made available to the Department of Health or their representatives upon request.

## Section E. Reporting and Notification Requirements.

1. A written plan must be submitted to and approval obtained from the Department of Health at least **thirty (30) calendar days** prior to the commencement of construction of each well. The Department of Health shall act on the approval in a timely manner provided all required and requested information have been submitted. Each plan shall include a drawing identifying the well location, the property boundary, access roads approaching and traversing the property, the location of the nearest residence, the locations of the ambient air quality monitoring stations, and hydrogen sulfide abatement procedures. The status of all previous constructed wells shall be provided including a clear description of the measures taken to shut-in the well. The Department of Health may at any time request for additional information.

2. The permittee shall notify the Department of Health in writing at least **two (2) working days** prior to the commencement, and within **two (2) working days** after the completion of the drilling, abated well cleanout, and flow testing operations, for each geothermal well. The Department of Health must concur before the permittee can commence operations.

3. Prior to any drilling, flow testing or abated well cleanout operation, the public shall be notified a minimum of twenty-four (24) hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum of twenty-four (24) hours in advance of each drilling, flow testing or abated well cleanout operation.

4. In the event of a well blowout, the permittee shall immediately proceed with measures to kill or gain control of the well and notify the Department of Health. The permittee shall submit to the Department of Health a written report within **five (5) working days** of the blowout. The report shall include, as a minimum, the probable cause of the blowout, the actions that have or will be taken, the estimated time before the well was controlled or is expected to be controlled, an analysis of the air quality impact from any unabated emissions, and a monitoring plan to determine the actual air quality impact resulting from the blowout. A status report shall be submitted to the Department of Health on a **daily basis** until such time the control of the well is established.

5. The permittee shall orally notify the Department of Health when an abnormality or a situation occurs that could result in an exceedance of the state ambient air quality standards, or has resulted in a hydrogen sulfide measurement of twenty-five (25) ppb or more (one-hour average) at any of the ambient air quality monitoring stations, or if not properly resolved, may threaten the health or safety of persons in the vicinity of the project site. Notification shall be provided immediately, unless the protection of personnel or public health or safety demands immediate attention to the abnormality or situation and makes such notification infeasible. In the latter case, the oral notice shall be provided as soon as practicable.

6. The Department of Health shall be immediately notified in accordance with Attachment IIB, Special Condition No. C.10, if the cumulative steam releases from either or both well drilling operations result in total **abated** hydrogen sulfide emissions of five (5) pounds per hour or more.

7. The Department of Health shall be immediately notified in accordance with Attachment IIB, Special Condition No. C.11, if during flow testing or abated well cleanout operations, the abated hydrogen sulfide emission rate increases to five (5) pounds per hour or more, or if any steam is released through the power plant emergency steam release facility (ESRF).

During periods of flow testing, abated well cleanouts, and well equipment failure or malfunction which result in hydrogen sulfide ambient air concentrations exceeding the specified limits in Attachment IIB, Special Condition No. C.15, the Department of Health shall be immediately notified. Within **five (5) working days** of the occurrence, a report shall be submitted to the Department of Health. The report shall include a description of the equipment failure or malfunction, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the repairs conducted to restore normal operations.

Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule, or order which results from the well equipment failure or malfunction.

8. The daily records specified in Attachment IIB, Special Conditions Nos. F.1.b.i, ii, and iii shall be reported **daily** to the Department of Health by telephone or facsimile no later than noon of the following work day. The Department of Health may at any time request additional data or revise the frequency of this daily reporting requirement.

9. Notification and reporting pertaining to the following events shall be done in accordance with Attachment I, Standard Condition Nos. 13, 15, 16, and 23, respectively:

    a. *Anticipated date of initial start-up, actual date of construction commencement, and actual date of start-up;*
    b. *Intent to shut down air pollution control equipment for necessary scheduled maintenance;*
    c. *Emissions of air pollutants in violation of HAR, Chapter 11-60.1 or this permit; and*
    d. *Permanent discontinuance of construction, modification, relocation, or operation of the facility covered by this permit.*

10. The permittee shall submit **semi-annually** the following written reports to the Department of Health. The reports shall be submitted within **sixty (60) days** *after the end of each semi-annual calendar period (January 1 to June 30 and July 1 to December 31)*, and shall be signed and dated by a responsible official.

    a. The monthly and rolling twelve (12) month fuel consumption records for the total combined fuel usage of all nine (9) diesel engines of the drilling rigs; and
    b. The maximum sulfur content (percent by weight), cetane index or aromatic content (volume percent), as applicable, of the fuel oil no. 2 fired in the diesel engines of the drilling rigs.

    The enclosed **Monitoring/Annual Emissions Report Form - Fuel Consumption** and **Monitoring Report Form – Fuel Certification**, shall be used for reporting.

11. Annual emission reports for the diesel engines shall be submitted to the Department of Health on the **Monitoring/Annual Emissions Report Form - Fuel Consumption**, in accordance with Attachment IV, Annual Emissions Reporting Requirements.

    Upon the written request of the permittee, the deadline for the reporting of annual emissions may be extended, if the Department of Health determines that reasonable justification exists for the extension.

## Section F. Testing Requirements.

1. The permittee shall conduct wet chemical tests for the determination of the hydrogen sulfide concentrations during periods of drilling, flow testing and abated well cleanout operations where geothermal steam is directed to the hydrogen sulfide abatement equipment.

    a. These tests shall be conducted during the following periods:

        i. At least once every six (6) hours per twenty-four (24) hour period during periods of drilling operations. Additional wet chemical tests shall be required if previous results indicate a +10 percent fluctuation in the hydrogen sulfide concentration; and
        ii. At least twice during the four (4) hours per day for abated well cleanouts and flow testing operations.

    b. The following data shall be recorded at these times:

        i. The hydrogen sulfide concentration (ppm) upstream from the chemical injection system;
        ii. The injection rate of sodium hydroxide;
        iii. The hydrogen sulfide concentration (ppm) downstream, after chemical injection, calculated hydrogen sulfide emission rate (lb/hr) and calculated hydrogen sulfide abatement efficiency (percent); and
        iv. Daily, the quantity of sodium hydroxide remaining in the abatement equipment storage tanks.

    The Department of Health may require additional data to be recorded when significant changes in the resource occurs and when changes are made in the injection rates of sodium hydroxide.

    The records shall be kept at the well location at all times during the drilling, flow testing and abated well cleanout operations.

2. The permittee shall sample and test the liquid and vapor phases of each geothermal resource well to determine the concentrations of the following constituents in the steam condensate, brine and noncondensible gases:

**Steam Condensate**

| | |
|---|---|
| Benzene | Fluorides (Total) |
| Ammonium (Total) | Mercury (Total) |
| Arsenic | pH |
| Lead | Total Dissolved Solids |
| Cadmium | Total Suspended Solids |
| Bicarbonate and Carbonate | Beryllium |
| Sulfates | Asbestos |
| Chlorides | Vinyl Chloride |
| Nitrates | Radon |
| Boron (Total) | Radionuclides (gross Alpha and Beta) |
| Hydrogen Sulfide | |

**Brine**

| | |
|---|---|
| Benzene | Fluorides (Total) |
| Ammonium (Total) | Mercury (Total) |
| Arsenic | pH |
| Lead | Total Dissolved Solids |
| Cadmium | Total Suspended Solids |
| Bicarbonate and Carbonate | Beryllium |
| Sulfates | Asbestos |
| Chlorides | Vinyl Chloride |
| Nitrates | Radon |
| Boron (Total) | Radionuclides (gross Alpha and Beta) |
| Hydrogen Sulfide | |

**Noncondensible Gases**

| | |
|---|---|
| Benzene | Carbon Dioxide |
| Hydrogen Sulfide | Arsenic |
| Ammonia | Beryllium |
| Mercury Vapor | Asbestos |
| Methane | Radon |
| Non-Methane Hydrocarbons | Radionuclides (gross Alpha and Beta) |
| Vinyl Chloride | |

The sampling and testing of the resource shall be performed once upon experiencing the first steam release, and at least once during abated well cleanout and flow testing operations.

During normal operation of each well, the sampling and testing of the resource shall be performed on an **annual basis**. During the testing of the noncondensible gases, if the hydrogen sulfide concentrations deviates more than +10 percent of the initial well test measurement, the permittee shall repeat the sampling and testing of the resource for the steam condensate, brine and noncondensible gases within the next **six (6) months**. The permittee shall be required to perform a retest only **once** after performing an annual resource test.

All sampling shall be submitted to a qualified laboratory for analyses within **five (5) working days** after obtaining the sample. The permittee shall submit a copy of the results of the analyses to the Department of Health within **five (5) working days** after receiving the results from the qualified laboratory. The Department of Health may at any time require the permittee to analyze for additional constituents or perform more frequent testing.

The Department of Health may waive the annual resource testing for a specific constituent upon prior written request of the permittee. Such a request would need to be justified on the grounds that previous testing had shown that constituent to be below detection limits. The annual resource testing may not be waived for more than two (2) consecutive years.

3. At least **thirty (30) calendar days** prior to performing tests and analyses of the geothermal resource well as required in Attachment IIB, Special Condition No. F.2, the permittee shall submit a written test plan to the Department of Health that describes the test methods, analytical procedures, the constituents to be measured and other parameters that may affect test results and analyses. Such a plan shall conform to U.S. EPA guidelines including quality assurance procedures. A test plan that does not have the approval of the Department of Health may be grounds to invalidate any test and require a retest.

4. Prior to the commencement of any geothermal well drilling, abated well cleanout, or flow testing operations which will result in the release of geothermal steam to the atmosphere, the permittee shall submit to, and receive the approval of, the Department of Health a sampling and testing protocol, identifying the analytical procedures and methodologies to be used and the constituents to be measured, which shall seek to physically and chemically characterize the particulate and aerosol emissions and corresponding ambient concentration from these operations. Each collected sample shall be submitted to a qualified laboratory for analyses within **five (5) working days** after the sample is collected. The permittee shall submit a copy of the results of the analyses within **five (5) working days** after receiving the results from the qualified laboratory. The Department of Health may at any time require the permittee to analyze for additional constituents or perform more frequent testing.

## Section G. Agency Notification.

Any document (including reports) required to be submitted by this permit shall be done in accordance with Attachment I, Standard Condition No. 25.